CAMEC®



PATENTED
SYSTEM TECHNOLOGY

RECYCLING SOLUTIONS
AND TURNKEY SYSTEMS

PATENTED GLASS REMOVAL
PHOTOVOLTAIC PANEL RECYCLING PLANT

High-purity recovery and valorization of glass, silicon, and metals from mono and bifacial photovoltaic panels

Photovoltaic Panels Treatment Plant

N°2 CAPACITY CONFIGURATIONS (60 / 120 PPH)

The CAMEC photovoltaic panel recycling plant is available in two industrial configurations, designed to ensure high productivity, low operating costs, and reliable continuous operation.
This patented technology enables the processing of both monofacial and bifacial photovoltaic panels, including glass/glass modules, while ensuring high-purity material recovery and valorization.

Our Unique Selling Points:

- Patented method for 100% glass removal
- 40% lower power consumption*
- 20% less required space*
- 30% lower operating costs*
- 1–2 year payback period
- Low-cost spare parts
- Reduced maintenance
- Operator safety
- Complete traceability
- CE certified, compliant with EU standards
- High-purity recovery of raw materials such as glass, silicon, and metals

Developed in collaboration with

ECOPROGETTI
SPECIALIST IN PHOTOVOLTAIC PRODUCTION PROCESS

PHOTOVOLTAIC PANELS RECYCLING LINE

2 WORKERS PER SHIFT

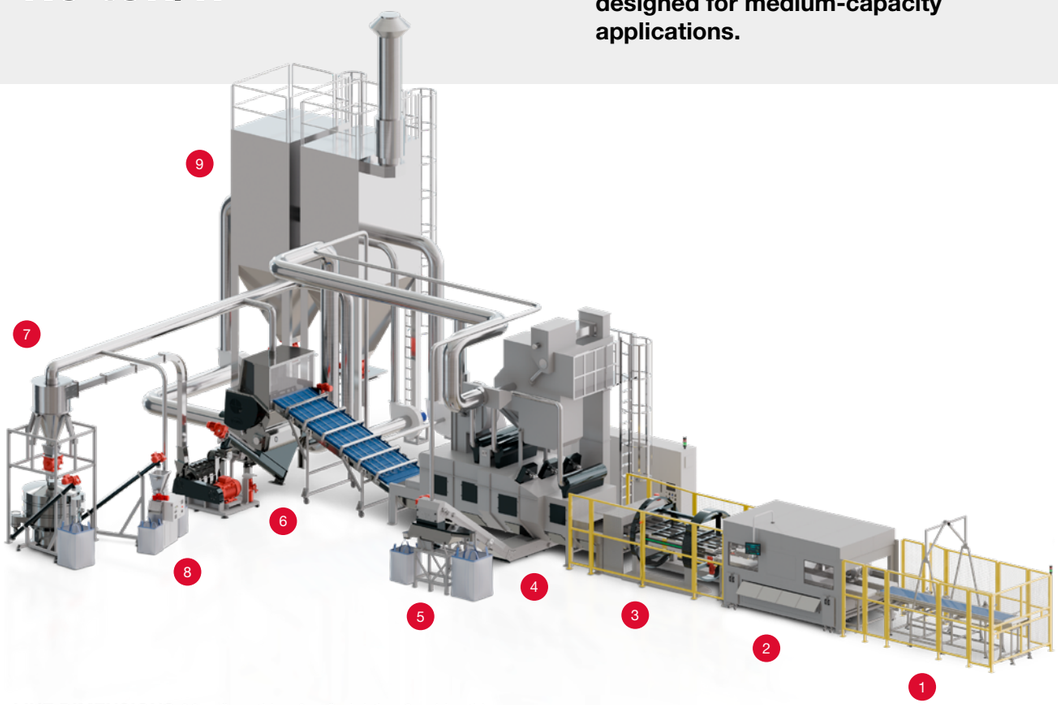
130 KW AVG. POWER

500 m² LINE AREA

ZERO EMISSIONS & NO CHEMICALS

60 panels/h
1.5 ton/h

Fully automatic recycling line designed for medium-capacity applications.



LINE DIMENSIONS 30m (length) × 6m (height) × 9m (depth)

EQUIPMENT LIST

1. Panel optical system
2. J-box removal and frame removal
3. Module flipping
4. Glass removal
5. Glass screening
6. Material shredding
7. Material division
8. Material collection
9. Air treatment system

PHOTOVOLTAIC PANELS RECYCLING LINE

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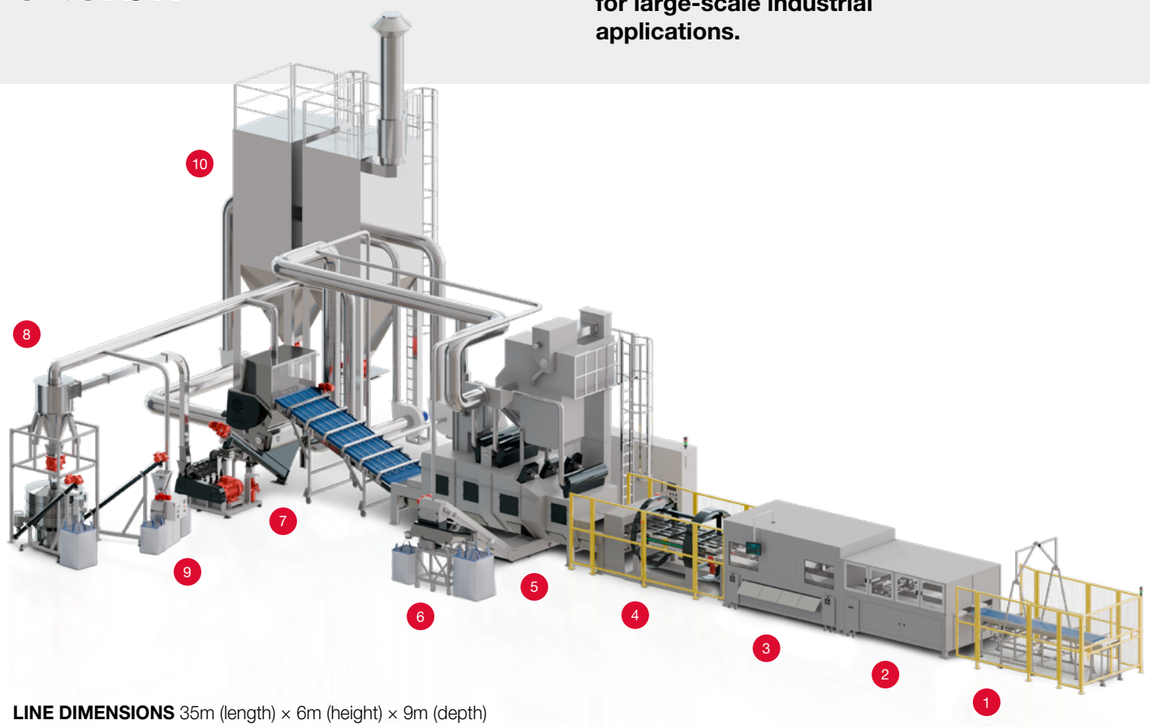
160 KW AVG. POWER

600 m² LINE AREA

ZERO EMISSIONS & NO CHEMICALS

120 panels/h
3 ton/h

High-capacity recycling line for large-scale industrial applications.



LINE DIMENSIONS 35m (length) × 6m (height) × 9m (depth)

EQUIPMENT LIST

1. Panel optical system
2. J-box removal
3. Frame removal
4. Module flipping
5. Glass removal
6. Glass screening
7. Material shredding
8. Material division
9. Material collection
10. Air treatment system

*The reported values are estimated based on a comparison with data from major competitors and may vary.

EQUIPMENT LIST

Panel Optical System

1



Identifies panel size and the J-box position, managing both single off-center units and three centralized junction boxes (new-generation photovoltaic modules).

J-box Removal

2



Automatically removes J-boxes from photovoltaic panels. Handles both single and triple centralized J-box types while easily integrating into Photovoltaic Panels recycling lines.

Frame Removal

3



Removes aluminium frames from photovoltaic modules. Adapts to different panel sizes. Includes automated frame unloading with a conveyor belt for efficiency.

Module Flipping

4



Flips the photovoltaic module before glass removal, with automated alignment ensuring stability, precise handling, and smooth integration in the recycling process.

Patented Glass Removal

5



Fully separates the front glass from the photovoltaic laminate. The recovered glass is discharged onto a conveyor belt, while the remaining laminate continues in the treatment process.

The **patented glass removal system** is the core technology of the photovoltaic panel recycling plant.
After the removal of the junction boxes and aluminium frame, the photovoltaic module is conveyed to the glass removal unit, where the front glass is completely separated from the photovoltaic laminate.

The electromechanical process ensures:
- **complete glass removal**
- **controlled and safe separation**
- **no combustion and no chemical treatments**



Glass Screening

6



Vibrating screen for granulometric classification of glass into three size fractions (fine, medium and coarse), with three dedicated independent discharge outlets.

Material Shredding

7



The laminate is processed through a Camec GRR280 single-rotor shredder for primary size reduction, followed by a second turbine stage for further granulometric refinement and separation of plastic and metallic fractions, optimizing component recovery.

Material Division

8



The shredded material is conveyed, via cyclone, to the circular vibrating screen, where it is separated by size and directed toward the discharge outlet.

Material Collection

9



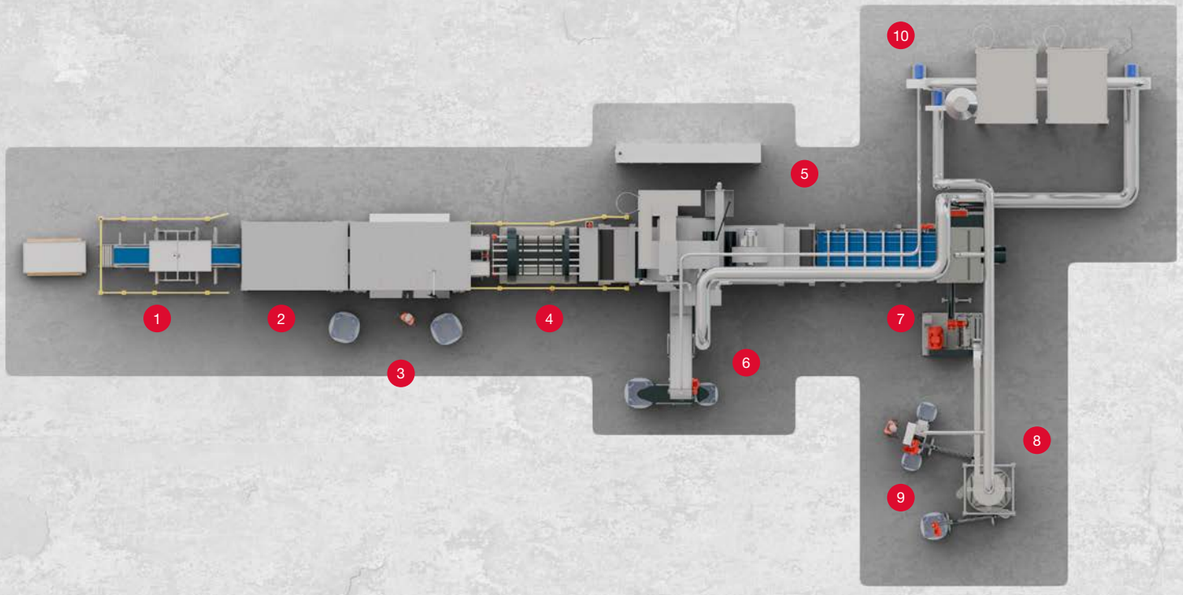
The light fractions (silicon dust and EVA fines) are conveyed via dedicated screw conveyors and discharged into big bags, while the densimetric table separates copper and other metals from the plastic granules.

Air Treatment System

10



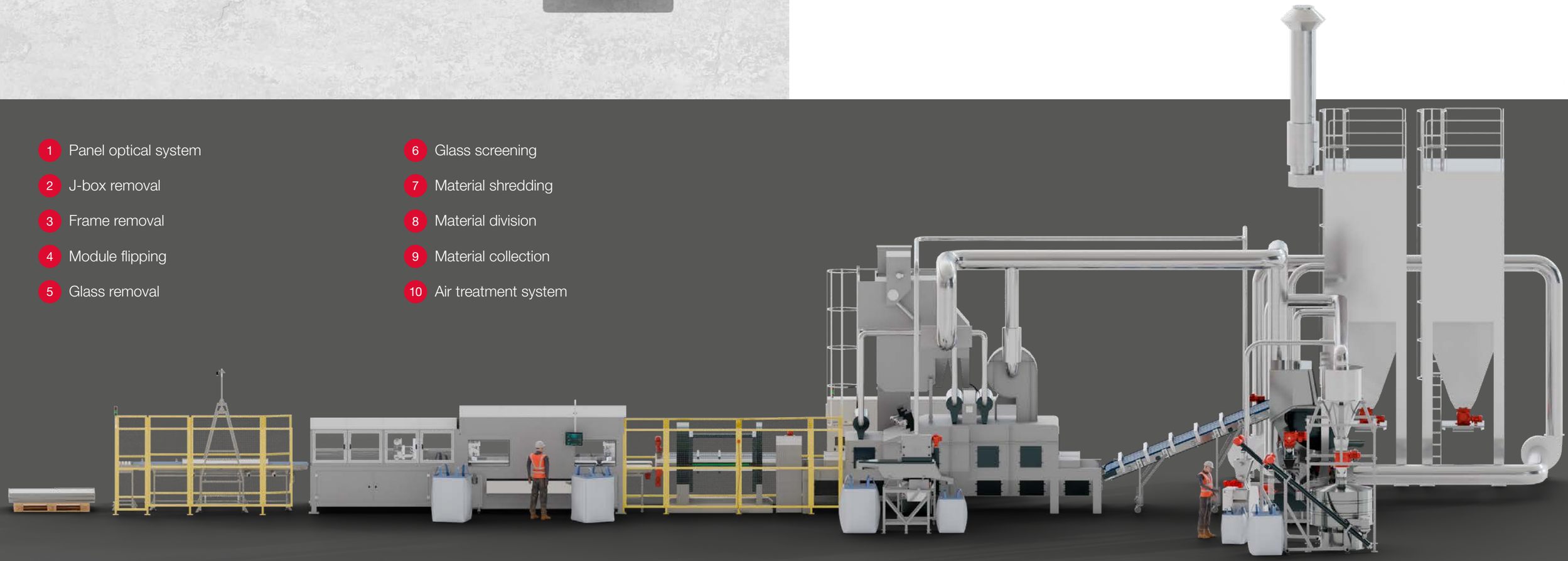
A baghouse filter removes fine dust generated during the photovoltaic panels recycling process. It captures airborne particles using fabric filter bags, ensuring a cleaner and safer working environment.



Turnkey Line for Photovoltaic Panels Recycling



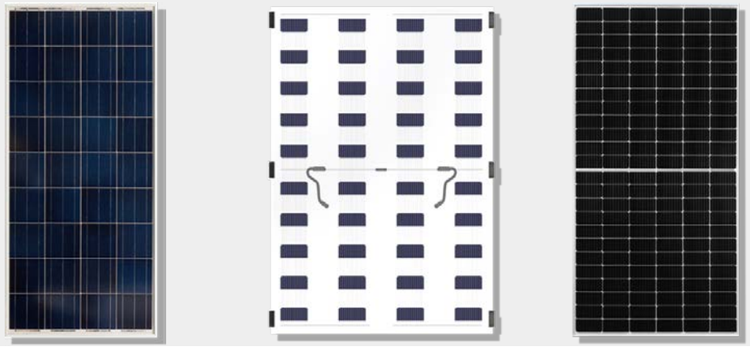
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RECYCLABLE PANELS

The panels recyclable with CAMEC lines are crystalline silicon panels

- ✓ **Monocrystalline & Polycrystalline**
- ✓ **Double glass / Bifacial**
- ✓ **Glass + Backsheet**



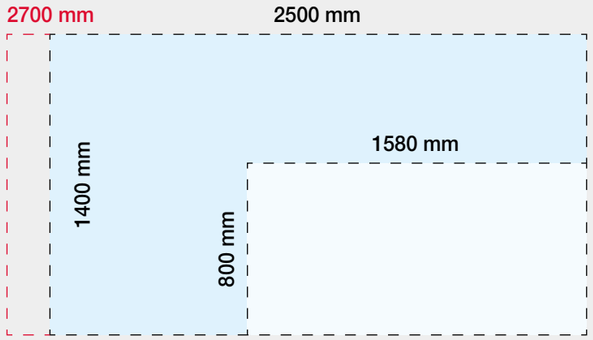
- ✗ **Thin-film / Amorphous**



- ✗ **Concentrated Photovoltaic**



99% of panel sizes currently on the market can be processed by our photovoltaic panels recycling line



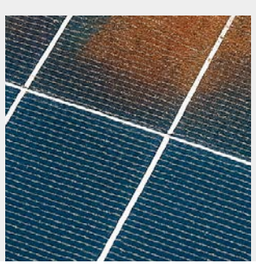
MIN 1580 mm x 780 mm
MAX 2500 mm x 1400 mm
Also available up to 2700 mm as an option.

OTHER FORMATS CAN BE REQUESTED DURING THE ORDERING PHASE.

RECYCLE PHOTOVOLTAIC PANELS IN ANY CONDITION!

- Damaged by hail or burned
- With broken / cracked glass
- With missing parts / holes
- Dirty, rusty, or worn
- Obsolete or very old
- Weather-corroded and delaminated
- Frameless
- The system can handle panel non-flatness up to 80 mm







RESULTS

WHAT IS A PHOTOVOLTAIC PANEL MADE OF?

AVERAGE PANEL WEIGHT		20 kg
GLASS	73%	14.5 kg
PLASTIC	12%	2.5 kg
ALUMINIUM	10%	2.1 kg
SILICON	3%	0.6 kg
METALS	2%	0.3 kg

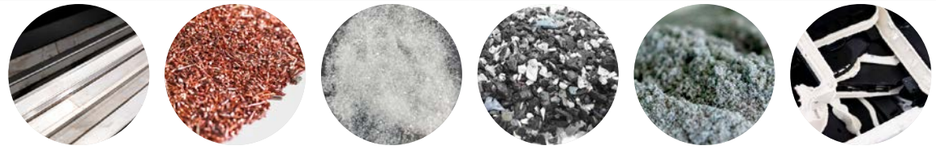
The data presented are average market values.



100% We recycle the entire panel

99% Materials we recover

RESULTS OF OUR RECYCLING SYSTEM



PHOTOVOLTAIC MODULE MATERIALS	1 ALUMINIUM	2 COPPER	3 GLASS	4 PLASTIC	5 SILICON	6 J-BOXES
PURITY	100%	98%	99%	88%	98%	100%
CONVERSION RATE	100%	99%	99%	98.5%	95%	100%
RAW MATERIAL REUSE	ALUMINIUM FOUNDRY	COPPER FOUNDRY	GLASS INDUSTRY	CONSTRUCTION	SEMICONDUCTORS	—

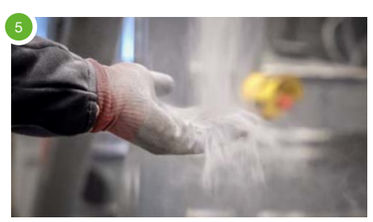
Conversion rate: the percentage of input material that is successfully transformed into reusable recycled output*.













*The stated percentages are indicative and may vary depending on the material processed and operating conditions.



ADVANCED AUTOMATION
Incorporates automation for enhanced process efficiency and reduced manual intervention.

NO COMBUSTION
No burning or melting of plastics.

NO RESIDUAL WASTE FOR DISPOSAL
100% recycling.

LOW ENERGY CONSUMPTION
Simple and efficient recycling process.

NO AIR EMISSIONS

NO CHEMICAL PROCESSING
Clean separation of glass, polymers, and metals.

HIGH-PURITY MATERIALS OUTPUT
Reusable as a secondary raw material.

ENVIRONMENTALLY FRIENDLY
No fumes, no wastewater, no chemical handling.

OPTIONAL SYSTEMS

COMPLETE J-BOX RECYCLING SYSTEM
High-efficiency shredding and separation of J-boxes

The line can be equipped with a dedicated quad-shaft shredder for J-boxes, designed to ensure controlled size reduction and effective separation of plastic components and ferrous and non-ferrous metals. The line supports advanced separation technologies, including eddy current systems for non-ferrous metal recovery, ensuring high-purity output materials.





COMPLETE ALUMINIUM PROFILE RECYCLING SYSTEM
High-efficiency shredding and separation of aluminium profiles

The line can be equipped with a dedicated quad-shaft shredder for aluminium profiles, designed to ensure controlled size reduction and effective separation of aluminium components.
The system also includes a specially designed tilting device, shaped to safely load aluminium profiles and discharge them directly into the quad-shaft shredder hopper, ensuring safe and controlled material handling. The line supports advanced separation technologies, including eddy current systems for non-ferrous metal recovery, ensuring high-purity output fractions.





GLASS/GLASS MODULE COMPATIBILITY*
Removal of the second glass layer

- Enables the safe and precise removal of the second glass layer in glass/glass photovoltaic modules.
- Designed to ensure full compatibility with glass/glass configurations, minimizing mechanical stress during separation.
- Adaptable to various glass sizes and thicknesses.



100%
COMPLETE GLASS-GLASS REMOVAL

*In collaboration with
ECOPROGETTI
SPECIALIST IN PHOTOVOLTAIC PRODUCTION PROCESS

SEMI-AUTOMATIC AND AUTOMATIC LOADING SYSTEM*
Recommended for high-capacity lines and high labor costs

Industrial Pantograph loading system

Designed for safe and assisted loading of materials onto the conveyor.
Ensures controlled movements and reduced operator effort during the loading phase.



Semi-automatic Pick & Place

Zero-gravity manipulator with a strong vacuum system, designed for safe handling and loading of photovoltaic panels onto a conveyor.



Robotic loading system

Robotized system transferring photovoltaic panels from pallet to conveyor, with two pallet positions for a continuous recycling process.



MOBILE PHOTOVOLTAIC PANEL RECYCLING SYSTEM*
Complementary equipment ECOMOVE

Container-based mobile line for on-site photovoltaic panel recycling, removing J-boxes and frames to reduce volume and simplify transport to recycling centers.

It includes:
- J-box removal
- Frame removal
- Integrated air compressor
- Battery pack
- Photovoltaic panels for power supply
- 20-feet container

PATENTED
SYSTEM TECHNOLOGY



Recycling Plants Division

CAMEC 's complete plants for solid waste treatment and transformation are functional technological solutions, custom built to meet the needs of each client and to recover secondary raw materials of high purity and high quality.

Design and construction of turnkey recycling plants.

REduce
REuse
REcycling

We work with a wide range of materials, guaranteeing top quality results and making our technology adaptable to match diverse industrial requirements.

- Tetra Pak®
- Aluminium
- Textile scrap
- Food waste
- Hospital waste
- Paper and cardboard
- Municipal solid waste
- WEEE
- Pulper waste
- Copper cables
- PVC profiles
- Tyres
- Plastic
- Bulky and industrial waste
- Ferrous material
- Wood
- Rubber
- Oil filters
- Photovoltaic Panels
- Toner Cartridge

Can't find your material in the list?
CAMEC supplies customized solutions, so just let us know what you need and what type of material you will be shredding.

We'll always offer the best possible solution.

See the complete list of materials on our site

Our Certifications

The company certifications we hold are a testament to the quality of our production process. We view them as authentic recognitions of our commitment to comply with standards and regulations, both national and international. The certifications constitute a value added for you, the customer, when you choose our products and services. They are a guarantee of our commitment to offering products that meet the highest quality and safety standards.

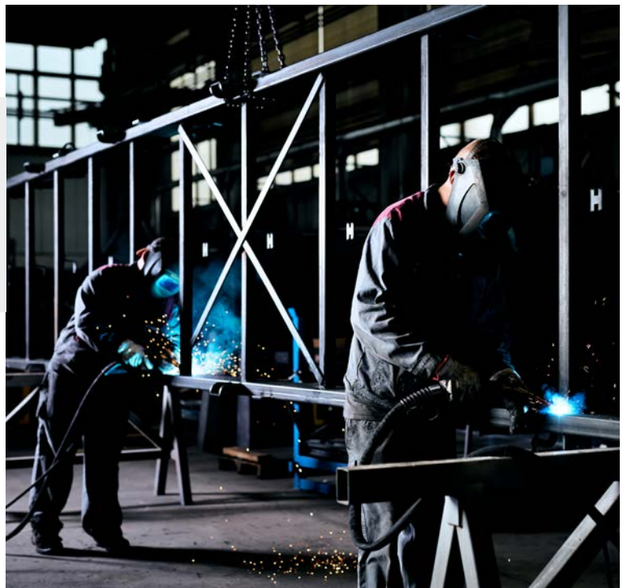
To offer ever more finely calibrated and meticulous service, at CAMEC we have secured official certifications to confirm the quality of our products.

QUALITY SYSTEM CERTIFICATION DNV ISO 9001
FPC CERTIFICATION DNV EN 1090-1
ENVIRONMENTAL SYSTEM CERTIFICATION DNV ISO 14001
CQOP SOA Costruttori Qualificati Opere Pubbliche

Tailored Customization

Tailored customization is the distinctive core of our company's approach to the market.
We recognize that each customer has different and unique needs, so we strive to create customized solutions that reflect their vision and needs.

From plant design to commissioning, each stage is guided by a collaborative and flexible process that considers the specific requests of our customers.



My CAMEC and After-Sale Service

Residual life assessment and revamping, after-sales service including tele-diagnostics, supply of parts, and maintenance, whether preventive, opportunity, or corrective: the MY CAMEC program is all of this and far more besides. More than simply a legal requirement, correct and thorough maintenance is essential to guarantee optimal operation of your machines and plants.

CAMEC has developed this assistance program in order to provide an accurate and continuous response to the needs of customers with customized yearly, two-yearly or three-yearly maintenance packages offering special terms and discounts on parts.

- **Preventive Maintenance**
- **Corrective Maintenance**
- **Opportunity Maintenance**
- **Revamping**
- **Spare Parts**

Since CAMEC operates a continuous improvement process on its products, also based on customer feedback, the data, descriptions and images contained in this catalog are indicative.



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